

Minutes  
ASWG Meeting # 6  
April 22,23 1999  
STScI, Baltimore MD

Crucial Presentations & ASWG Meetings

AAS Session, June 3,  
ASWG meeting June 4-5 (Chicago)  
NGST Science and Technology Exposition,  
13-17 September (Hyannis Port)  
ASWG ISIM Prioritization #1 (Nov. 3-5, STScI)  
ASWG ISIM Prioritization #2 (Nov. 22-23, GSFC)

Key Actions:

1. Make arrangements for AAS ASAP through [Jennings@stsci.edu](mailto:Jennings@stsci.edu);
2. Review and correct DRM programs
3. Register for "Woods Hole Meeting"  
[ngst.gsfc.nasa.gov/science/meetings/WHannouncement.html](http://ngst.gsfc.nasa.gov/science/meetings/WHannouncement.html)

Attendees: The following ASWG members were unable to attend: Jill Bechtold, Avi Loeb, Bruce Margon, Marcia Rieke, and Peter Schneider.

Thursday

1.0 Introduction (Mather, Stockman, Lilly, and Schreier) Project Status & Role of the ASWG in 1999-2001 (see charts). Although refining the DRM is the most important nearterm activity for the ASWG (see below), the top priority in CY 1999 is the prioritization of science instruments to be accomplished by the Woods Hole Meeting (actually in Hyannisport) and two meetings in November.

In CY 2000-2001, the ASWG will support and review the Prime Contractors, ISIM, and Sci Ops Concepts (from STScI). The ASWG will develop Science Policies 2000-2001 in preparation for the AO and continue with outreach activities to the astronomical community.

Part of the job of the ASWG will be to understand applications of potential SI's to DRM programs:

- sensitivity, observing time, FOV, angular resolution, spectral range, resolution, accuracy
- science drivers: roll angle range and stability, # and freq. of visits, aperture/FOV, optical perfection (freq. of calibration, stray light, etc.), pointing (absolute and stability), thermal, data rate/onboard processing, parallel observations, astrobiology capabilities, detector specifications, etc.

The Canadian Space Agency budget has been augmented and NGST plays a prominent role in CSA space science. Overall, the picture is good for the Canadian collaboration in NGST.

2.0 Parallel Science Discussion (Stockman): The argument for needing parallel data taking for calibration purposes is straightforward. However, there is no clear need for parallel science capabilities on NGST for specific science programs. However, if science instruments have commensurate fields of view and exposure times, then parallel science - on the sky -- may result in significant efficiency improvements for large surveys. A cursory review of the DRM does not indicate much saving but this needs to be repeated after the DRM are refined.

### 3.0 The Design Reference Mission (Larry Petro)

- A new Exposure Time Calculator is available <http://www.ngst.stsci.edu/ASWG.html>
- However, most currently available DRM programs either significantly exceed or under-run their allocated times, either because we have been unable to interpret them correctly or because the old exposure estimates were drastically wrong. This situation is serious because the Phase A studies will be based largely upon the DRM!
- ACTIONS on all ASWG Members:
  - Review the allocated times in the attached presentation and use the new ETC to correct the programs accordingly
  - Work with the theme leads to ensure that each theme does not exceed its allocated portion of the 2.5 year mission.
  - This work must be completed before the AAS meeting where it will be presented by the theme leads, along with a three-tiered prioritization, to the ASWG.

### 4.0 New DRMs and Science Programs

- John Trauger described a coronagraphic study of Jupiter-like planets around nearby stars (out to 20 pc). The key is the 4.6-5.1 micron band. Needs stable optical segments.
- Tom Greene presented an astrobiology DRM that studies pre-biotic materials in various phases of star and planet formation.  
needs spectral 2-10 (20+ desired) coverage with  $1000 < R < 3000$  to resolve ices.

### 5.0 ISIM issues (Matt Greenhouse)

- grass roots cost estimate for ISIM and SI's costed at average Civil Servant and contractor labor rates plus science team costs
- spreadsheet on the WWW
- Described overall prioritization scheme for ASWG and technical reviews of ISIM Study concepts in November.
- Described ongoing studies to select a material for the ISIM enclosure and instruments. An All-Aluminum ISIM (including diamond turned optics) might be cheap but heavy. Matt does not want to spend ISIM funds on exotic materials unless it is absolutely necessary.

### 6.0 NIR Spectrograph Committee (Knox Long)

- The STScI has chartered a committee led by John Huchra (CfA) to review the different spectrometer designs in regard to the DRM and provide a white paper to STScI and GSFC. This effort generated a long of discussion (see below) as the

ASWG was unhappy with a new committee and Lilly and Jakobsen were unhappy with the timing relative to the CSA and ESA instrument studies.

## 7.0 Misc. ISIM Presentations

UA Micro-mirror performance modeling (Kimberly Ennico)

- need local contrast 100:1 to 1000:1 for low resolution spectroscopy (e.g. low scattering from mirrors)
- more problems at  $R \sim 1000$  than 100
- more difficult for mid-IR

Micro-mirror results (John MacKenty): scanning electron microscope (SEM) images of recent GSFC prototypes

Micro-shutter results (Harvey Moseley) showed (SEM) and a design giving a 80% fill factor.

Performance of FTS vs. grating spectrometers vs. Fabry Perot (FP) (Shobita Satyapal)

- FTS beats FP except for  $R < 20$  to 40 (then about equal)
- Gratings beat FTS for  $R \sim 100$  and by a lot at higher resolutions

FTS Performance Results (James Graham): Presented examples of FTS science.

Galaxy Statistics based upon HST Deep Fields with NICMOS (Jon Gardner)

- 10,000 galaxies in  $3 \times 3$  FOV at limiting spectrometer magnitudes
- galaxies are getting smaller as we go fainter (also true in near IR, indeed they may even be more compact in the NIR)
- isophotal filling factor in white light STIS image at 0.65 sigma flux level coverage is 5.18% (e.g. most of the sky is blank for continuum spectroscopy)

ESA Science Studies (Peter Jakobsen)

The ESA payload studies have reached many of the same conclusions as those of the Project and are concerned about:

- Funding for more than 2 instruments
- Thermal budgets
- Weight budgets

Discussion of Detector Workshop

- Workshop a great success, ~180 attendees
- Detector performance is close to what is needed for NGST
- $2k \times 2k$  formats possible but risky in terms of maturity
- Greenhouse to set up an expert detector subcommittee to address nearterm desiresments with regards to cosmetics, full well, read-noise, dark currents. QE etc. ASWG should set up a longer term detector subcommittee.

## 8.0 Operations Concept Studies (Rodger Doxsey)

The STScI group plans to produce white papers on consequences of various design choices:

- target dates: Woods Hole, Interim Report (Nov99), Final Report (May 00), STScI Phase A report (Jan 01)
- orbit/momentum management is tricky; need to revisit orbit question; delta-V limited
- fine guidance design to be revisited
- observing tactics – what is a typical observing sequence

Thursday afternoon-Friday Morning

## 9.0 Executive Session: NESR issues & Huchra study

This session spilled over into Friday, so we summarize it here. The chief NESR issues were:

- DRM needs better scientific balance -- some programs were not nearly as compelling as others were. The ASWG is addressing this.
- ASWG and NGST needs strong leadership -- equal to Project Manager. Mather is at same level as the PM within NASA.
- NGST needs better outreach to the astronomy community. The UVOIR panel also echoed this. We need to keep working at being inclusive and bringing in new ideas. (But in part these reactions are due to some feeling left out because NGST has progressed so quickly. In the X-ray community, which is smaller, this would not be as much of a problem because everyone would get onboard at the outset.)
- "Stick to the core" This is partly a NESR concern about NGST becoming a Xmas tree. Our funding won't permit it and we need to reiterate that NGST will have 2-3 instruments at the most. The Origins subcommittee was concerned that we are too narrowly focused, and recommended that we adopt an Astrobiology program. (Sigh)

Other than the homework associated with improving the DRM and our outreach through the speakers bureau, slide materials, and the AAS, the ASWG felt that it had addressed most of the NESR issues.

As mentioned above, the ASWG became riled up about the Huchra committee: it would overlap the ASWG charter and because it had the potential of short-circuiting some of the instrument studies before they were formally submitted in late-Sept. and early Oct. Much of the rationale for the Huchra committee was to do studies that the STScI lacked the staff to do this summer. The ASWG took two actions:

1) It recommended that the Huchra committee, if it were to go forward, concentrate on the generic capabilities of various spectrographic designs in regard to the NGST DRM and overall science goals and that its report explicitly be made to the ASWG prior to the more complete ASWG studies. Ethan Schreier agreed to these changes and will work with Mather to come up with a charter acceptable to all involved.

2) The ASWG agreed to form at least three subcommittees to address the NGST instrument complement and make their results and recommendations known to the entire ASWG in November. John Mather will circulate a draft of the charters for the

subcommittees as well as a description of the prioritization process in November. He will negotiate with suggested chairs and will deal with conflict of interest issues on the subcommittees.

It was also agreed that the ISIM PI s would join the ASWG during the initial subcommittee presentations but would break out to consider other issues when the ASWG came to closure and maybe voting on priorities.

#### 10. Headquarters (Harley Thronson by telecon)

NGST looks good at the HQ level. The various review groups have praised the scientific aspects of the program but still have difficulty accepting the low cost goal. Harley's advice was to keep up the good work and wear a big hat! (means have a broad view of the program).

Harley was pleased with the NESR process but didn't want the ASWG to sweat every concern raised by the NESR. We need to keep working on outreach, although he believes that NGST is far more open than other programs at a similar phase.

#### 11. Outreach (Carol Christian)

We need to work on community outreach at the grassroots and community level. The STScI Office of Public Outreach will call on the expertise of the ASWG to put materials together and will make the science WebPages more interesting and useful to the ASWG as well as the general astronomers. Legislative and public outreach is at a low level now but will grow as the Project moves toward development.